CLAIMS OF AMENDMENT

Accepted by the International Bureau on June 28, 2005 (28.06.05); claim 1 of the original application has been amended; no changes were made in other claims.

1. A ultrasonic motion detecting device, comprising:

first and second ultrasonic transducers having piezoelectric elements arranged in an array, which transmit ultrasonic waves to an object and acquire reflection signals from the object;

a motion detection unit that extracts an estimation region which is used for estimating a motion of the object from the reflection signals that are acquired by the first and second ultrasonic transducers, and detects a three-dimensional motion within the estimation region; and

an image display unit that displays the three-dimensional motion within the estimation region,

wherein ultrasonic wave scanning surfaces due to the first and second ultrasonic transducers cross over each other, and

wherein the motion detection unit detects, for a plurality of frames, a first two-dimensional cross-section image of the object which is obtained from the first ultrasonic transducer and projected components that are detected from a second two-dimensional cross-section image of the object which is obtained from the second ultrasonic transducer, and detects

a three-dimensional motion on the basis of the first two-dimensional cross-section image and the projected components.

2. The ultrasonic motion detecting device according to claim 1, wherein the first and second transducers alternately conduct ultrasonic scanning to acquire a biplane image including two scanning surfaces which are not in parallel to each other.

3. The ultrasonic motion detecting device according to claim 1, wherein the first and second transducers alternately transmit and receive ultrasonic beams to acquire a biplane image.

4. The ultrasonic motion detecting device according to claim 1, wherein the signal component used for estimating the motion comprises a contour component of the object, a speckle component occurring by allowing the reflection signals from point reflectors that are scattered within a body of the object to interfere with each other, or a combination of the contour component with the speckle component.

5. The ultrasonic motion detecting device according to claim 1, wherein a plurality of estimation regions are set to estimate the partial motions of the object to detect the movement and/or deformation of an inspection region within the object.

6. The ultrasonic motion detecting device according to claim 1, wherein a correlation function of a plurality of one-dimensional signals of the reflection signals that are

acquired by the first and second ultrasonic transducers is conducted within the estimation region.

7. The ultrasonic motion detecting device according to claim 1, wherein the motion estimation is conducted on the respective biplane images consisting of the two scanning surfaces to detect the velocity components of the three-dimensional motion of the object.

8. The ultrasonic motion detecting device according to claim 1,

STATEMENTS UNDER ARTICLE 19(1)

Claims 1 to 8 are estimated as no inventive step in an opinion of the International Searching Authority. Accordingly, claim 1 is amended.

The amended claim 1 adds the technical feature "the motion detection unit detects, for a plurality of frames, a first two-dimensional cross-section image of the object which is obtained from the first ultrasonic transducer and projected components that are detected from a second two-dimensional cross-section image of the object which is obtained from the second ultrasonic transducer, and detects a three-dimensional motion on the basis of the first two-dimensional cross-section image and the projected components". This feature is supported, for example, in paragraphs 0056 and 0057 of the present specification.

The amended claim 1 explicitly show the feature of the present invention, thereby being capable of obtaining the inherent advantages that a signal processing time is shortened as compared with the conventional motion detection conducted by the three-dimensional imaging, and the state of the three-dimensional deformation and motion of the object can be displayed in real time. These advantages are supported, for example, in paragraph 0037 of the present specification.

None of cited references teach or suggest the above feature of the present invention. In addition, the combination of

Documents 1 and 2, or the combination of Documents 1 and 3 fails to suggest the feature of the present invention. Document 3 discloses only a one-dimensional (projected component) measurement, but fails to disclose that the three-dimensional motion is detected by using the two-dimensional cross-section image.